

5

### Patent Claims

- 10 1. A bone-analogous coating for metallic implant materials, comprising a collagen matrix mineralized with a calcium phosphate phase.
- 15 2. A coating according to Claim 1, wherein the collagen matrix is layered.
- 20 3. A coating according to Claim 1, wherein the calcium phosphate phase of the matrix contains amorphous calcium phosphate ( $\text{Ca}_9(\text{PO}_4)_6 \cdot n\text{H}_2\text{O}$ ), hydroxyapatite ( $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ ), octacalcium phosphate ( $\text{Ca}_8\text{H}_2(\text{PO}_4)_6 \cdot 5\text{H}_2\text{O}$ ), brushite ( $\text{CaHPO}_4 \cdot 2\text{H}_2\text{O}$ ) or mixtures thereof.
- 25 4. A coating according to Claim 1, wherein the calcium phosphate phase is doped with fluoride, silver, magnesium or carbonate ions or combinations thereof.
- 30 5. A coating according to Claim 1, wherein the collagen is collagen of type I.
- 35 6. A coating according to Claim 1, wherein the collagen is a mixture of collagen of types I to III.
7. A coating according to Claims 1, wherein said coating further contains gelatin.

8. A coating according to Claims 1, further containing growth factors, peptide sequences, hormones, antibiotics or mixtures thereof.
- 5 9. A coated metallic implant comprising a metallic implant having an outer layer, wherein the outer layer comprises a coating according to Claim 1.
- 10 10. A coated metallic implant according to Claim 9, wherein the metallic implant is made of titanium or titanium alloy.
- 15 11. A process for the electrochemical coating of metallic implant materials with a mineralised collagen matrix comprising:
- 20 a) coating a metallic implant material by immersion in a collagen solution at a pH of less than 8 and a temperature 4 - 40°C, and
- 25 b) coating said metallic implant material with a calcium phosphate phase (CPP) in an electrochemically assisted process by means of galvanostatic polarization in an electrolyte solution comprising calcium ions and phosphate ions,
- wherein process steps a) and b) are performed simultaneously or sequentially.
- 30 12. A process according to Claim 11, wherein an additional process step b) is placed in front of process step a).
- 35 13. A process according to Claim 11, wherein the process steps a) and b) proceed alternately a number of times.

09885237.062101

14. A process according to Claim 11, wherein the process steps a) and b) are combined into one step, the metallic implant material to be coated being electrochemically polarized cathodically in a collagen solution comprising calcium ions and phosphate ions.
15. A process according to Claim 11, wherein a cathodic current flow of  $-0.2$  to  $-50 \text{ mA/cm}^2$  flows for 25 to 40 minutes during the galvanostatic polarization in process step b).
16. A process according to Claims 11, wherein the mineralised collagen matrix is layered.
17. A process according to Claims 11, wherein the coating further comprises gelatin.
18. A process according to Claim 11, wherein a cathodic current flow of  $-0.5$  to  $-30 \text{ mA/cm}^2$  flows for 30 to 40 minutes during the galvanostatic polarization in process step b).
19. A process according to Claim 11, wherein a cathodic current flow of  $-1$  to  $-10 \text{ mA/cm}^2$  flows during the galvanostatic polarization in process step b).
20. A process according to claim 11, wherein the galvanostatic polarization in process step b) is performed at a temperature of  $30-40^\circ \text{C}$ .
21. A coated metallic implant comprising a metallic implant having an outer layer, wherein the outer layer is  $0.04-150 \text{ }\mu\text{m}$  thick and comprises a coating according to Claim 1.